

C l a i m s

- SUB AB) 1. A device by a tool (1) adapted for changing the direction of drilling during drilling with drilling equipment, which preferably comprises a drill string such as coiled tubing, drill string sub, drilling engine and drill bit, wherein the tool (1) is positioned between the drill string and the bent sub, comprises housing elements (2-4), which are connected to one another, has a passage for, i.e., fluid such as drilling fluid, and wherein the tool (1) is equipped with a hydraulic piston (18) having been provided with a set of co-operating guides (26, 27) where the guides (26, 27) are arranged for by the pistons axial displacement a forced guiding of the rotation of one of the housing elements (5) with respect to the other housing elements (2-4), and where necessary fluid pressure for moving the piston (18) is obtained by choking the pressurefluid flow through tool (1), characterized in that the lower intermediate housing element (4) and the lower housing element (5) are connected by a one direction rotatable connection (8) such as a roller bearing, adapted for only allowing rotation in one direction and opposes any rotation in the other direction at any rotational position.
2. A device according to claim 1, characterized in that one set of the guides (26) is formed in the wall of the passage, and one set of guides (27) is formed in the wall of the piston (18) opposite.

- SUB A2) 3. A device according to one or any of the preceding claims, characterized in that said set of guides (26, 27) for the forced guiding of the rotation are formed by twisted splines, one set of splines (26) being formed in a circumferential portion of the upper intermediate housing element (3), whereas one set of splines (27) is formed in a circumferential portion of the piston (18).
4. A device according to one or any of the preceding claims, characterized in that the former set of splines (26) extends in a region at the upper end of the lower housing element (5), whereas the latter set of splines (27) extends essentially in the longitudinal direction of the piston (18).
5. A device according to one or any of the preceding claims, characterized in that the valve comprises a valve seat (20) formed at the upper end of a bore adapted to provide a passage through the piston (18), a valve body (21) and a valve mechanism (22, 23, 24) adapted for choking and opening the valve by increase and relief, respectively, of the fluid pressure in the tool (1).
6. A device according to one or any of the preceding claims, characterized in that the valve mechanism is formed by an upper and a lower valve body part (22, 23) adapted for displacement along the valve body (21), so that the lower valve body part (23) can choke or open the valve, and a valve body spring (24), wherein the upper valve body part (22) will displace the

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lower valve body part (23) to choke the valve when the pressure of the fluid is increased, and the valve body spring (24) will displace the lower valve body part (23) in the opposite direction to open the valve by a relief of the pressure of the fluid.

7. A device according to one or any of the previous claims, characterized in that the piston (18) is adapted to be displaced by the fluid supplied to the tool (1) when the valve has been choked, or be displaced in the opposite direction by a piston spring (25), positioned in an upper annular space (17), formed in the passage of the tool (1), after the valve has opened.

8. A device according to one or any of the previous claims, characterized in that the piston (18) is sleeve-shaped, positioned between an upper shoulder (14) formed in the passage of the tool (1), and a shoulder element (31) located in the upper annular space (17), and formed with a length which enables the piston (18) to extend from the upper shoulder (14) into the upper annular space (17) located in the extension above a lower shoulder (15) formed at the lower end of the upper annular space (17).

9. A device according to one or any of the previous claims, characterized in that the piston (18) and the upper end of the lower housing element (5) are displaceably and rotatably connected.

10. A device according to one or any of the previous claims, characterized in that the displaceable and

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rotatable connection is formed by a ratchet mechanism (28) formed with catch elements (30) locking against, or running freely across, guides (29) formed at the upper end of the lower housing element (5), so that the lower housing element (5) is subjected to rotation when the piston (18) is displaced down the passage of the tool (1), or is without rotation when the piston (18) is displaced back through the passage of the tool (1).

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11. A device according to one or any of the previous claims, characterized in that the lower housing element (5) has a lower annular space (36) arranged thereto, for fluid which is displaced from the upper annular space (17), that the annular spaces (17, 36) communicate by means of channels (38, 39) extending between the annular spaces (17, 36), and that the flow of displaced fluid can be controlled by a check valve (40) and a choke valve (41) placed in the respective channels (38, 39).

12. A device according to one or any of the previous claims, characterized in that the lower annular space (36) has a displaceable annular space body (37) arranged thereto.

13. A device according to one or any of the previous claims, characterized in that the valve body (21) and the valve body part (22) are formed with bores, so that, for example, a cable can be drawn through the passage of the tool (1).

ABSTRACT

ADD A1

ADD A2

ADD A3

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PATENT SHEET (ARTICLE 19)